

This review sheet should NOT serve as your only review. You should review all notes and tests.

Questions 1 through 7 refer to the graph of  $y = f(x)$  shown to the right.

1.  $\lim_{x \rightarrow 1^-} f(x) =$

2.  $\lim_{x \rightarrow 1^+} f(x) =$

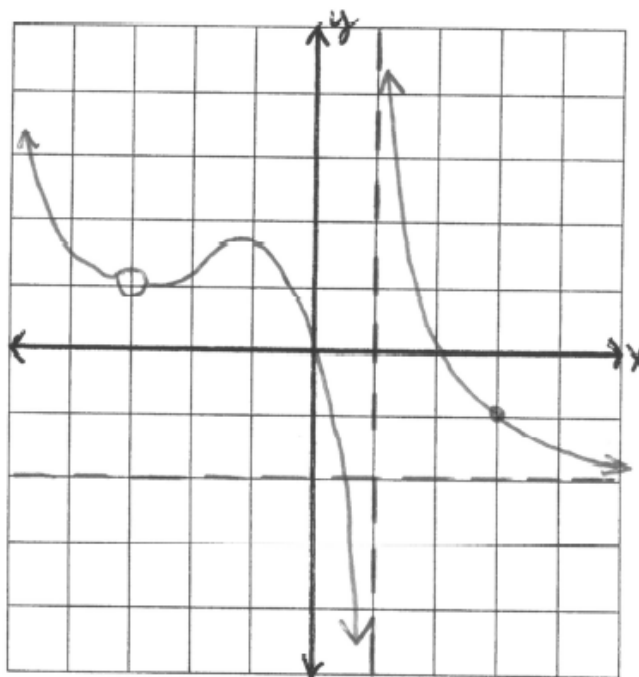
3.  $\lim_{x \rightarrow 1} f(x) =$

4.  $\lim_{x \rightarrow -3} f(x) =$

5.  $\lim_{x \rightarrow 3} f(x) =$

6.  $\lim_{x \rightarrow -\infty} f(x) =$

7.  $\lim_{x \rightarrow \infty} f(x) =$



For each of the following functions, use the definition of derivative to find  $f'(x)$ .

Recall:  $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

8.  $f(x) = 2x^2 - 8x + 5$

Find the derivative of each of the following:

9.  $f(x) = 5x + 2\sqrt[3]{x} - \frac{3}{x^2}$

10.  $f(x) = \sin(3x+1)$

11.  $f(x) = \sqrt[4]{(x^2 + 5x)^3}$

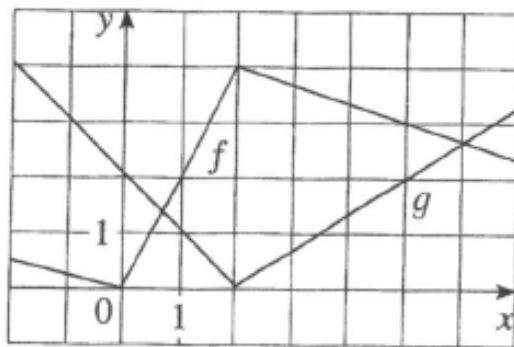
12. Find the slope of the line tangent to  $y = x(\cos(x))$  when  $x = 0$ .

13. Write the equation of the line tangent to  $y = 3x^2 - 2x + 1$  when  $x = -1$ .

14. Write the equation of the normal to  $y = 5 - x^2$  when  $x = 2$ .

15. If  $f$  and  $g$  are the functions shown below. Let  $h(x) = f(g(x))$  and  $s(x) = f(x)g(x)$ .

Find:  $h'(1)$  and  $s'(1)$



16. The following table records the values of  $f$ ,  $f'$ ,  $g$ , and  $g'$  at  $x = 1$ ,  $x = 2$ , and  $x = 3$ .

$x$	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	1	2	3
2	5	4	3	4
3	0	6	-1	-2

If  $n(x) = \frac{f(x)}{g(x)}$ ,  $h(x) = f(g(x))$ , find the value of each of the following: a)  $n'(2)$       b)  $h'(1)$

17. If  $f(x) = \sqrt[3]{(x^2 - 2x - 1)^2}$ , then  $f'(0) = ?$

18. Is  $h(x)$  continuous for all real numbers? If so show why.

$$h(x) = \begin{cases} x+3, & x \leq -2 \\ -x^2, & x > -2 \end{cases}$$

19. Evaluate  $\lim_{x \rightarrow 2} \frac{x^2 + 3x - 10}{x - 2}$ .

20. Evaluate  $\lim_{x \rightarrow \infty} \frac{2x^3 - 3}{3x^3 + 25}$ .

21. Given the function,  $f(x) = 2x^2 - 5x$

- Find the average rate of change over x-interval  $[0, 3]$ .
- Find the expression for the instantaneous rate of change at any  $x$  value.

22. Find the equation of the normal line to the curve,  $f(x) = \frac{1}{4}x^4 - \frac{1}{3}x^3 - x^2$  when  $x = -2$ .